BENEFICIAL USE RECONNAISSANCE PROJECT

COORDINATED WATER QUALITY MONITORING PLAN

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INTRODUCTION

There are several federal and state legislative mandates driving this project, they include:

1. Clean Water Act
2. State Antidegradation Policy
    a. Stream Segments of Concern
    b. Outstanding Resource Waters
3. EPA/State Watershed Priority List
4. State Water Quality Status Report 305(b)
5. State Water Quality Limited Segments, 303(d)
6. Development of biological water quality criteria standards for Idaho

In 1975 in accordance with the 1974 Clean Water Act, the State established Water Quality Standards and Wastewater Treatment Requirements. The rules, standards and requirements were created to deal with the problems related to personal health and water pollution. The rules designated "uses" which were/are to be protected. Appropriate uses, now refered to as "Beneficial Uses" are any of the various uses which may be made of the water of Idaho, including but not limited to:

domestic water supply
agricultural water supply
industrial water supply
cold water biota
warm water biota
salmonid spawning
primary and secondary contact recreation
wildlife habitats
aesthetics

"Waters are designated according to the uses for which they are presently suitable or intended to become suitable." In 1975 very little data or field information existed on which to base designations, thus "best professional judgement" guided those individuals in designating uses of Idaho waters. These are now part and parcel to the Water Quality Standards for the six hydrologic basins in Idaho (section 01.02110). By in large these use designations have not changed appreciably in the last 19 years.

Review and update of these uses comes through recomendations from the Idaho Health and Welfare Board to the state legislature. These recomendations are based on data generated from field monitoring of the chemical, physical and biological components of water quality and determinations of attainabiility and appropriateness of designated uses.

The amended 1987 Clean Water Act section 305(b) required each state to complete a statewide water quality assessment (section 319), and come up with a program to control nonpoint source pollution affecting surface waters. The completed document, combing sections 305(b) and 319, was entitled, "1988 Idaho Water Quality Status Report and Nonpoint Source Assessment." Once again two types of data were used in this assessment, monitored and evaluated. Monitored being actual field data and evaluated being best professional judgement. Monitored data made up approximately 17 percent of the assessment. The 1992 Idaho Water Quality Status Report incorporated little hard data beyond the 1988 assessment.

Part of the biennial Water Quality Status Report is the listing of those waters in the State failing to support one or more designated beneficial uses, commonly refered to as section 303(d). This list has created many problems and embarrassements for the Division of Environmental Quality over the years, since many of these determinations have relied on limited field data and more on professional judgements. The State has listed, delisted and had the federal Environmental Protection Agency relist water bodies that were deemed water quality limited. Here again DEQ needs the hard data to either substainate a listing or refute an already listed body of water and satisfiy the public that we know what we are doing.

Another aspect of Section 319 lead to the creation of Idaho's Antidegradation Policy in 1988. Out of this policy arose Stream Segments of Concern, streams for which the Division of Environmental Quality is responsible for determining current water quality conditions. DEQ monitors and coordinates with other agencies in collecting/gathering data for these determinations. This information is then disseminated to the public at the biennial Basin Area Meetings. As with past assessments of water quality much of these assessments rely on best professional judgement, very little hard data exists on which to base these evaluations. It is imperative that the beneficial uses assigned through the Water Quality Standards and Waste Water Requirements accurately reflect uses that are existing or attainable. This process will then confirm that proper beneficial uses have been designated.

EPA is pushing Idaho to meet yet another requirement of the 1987 Clean Water Act, development of biological water quality criteria. These are then to be incorporated into state Water Quality Standards. Narative biocriteria as it is called are to be set out in 1993 and numberical biocriteria developed by 1996. To fill theses data gaps and better refine our beneficial use designations DEQ is embarking on a synoptic survey of state waters. This is to be done by employing simple yet informative measurements and collections of the biota and habitat existing in these waters. Since cold water biota and slamonid spawning are the two most sensitive uses, this project will focus on them. This reconnaissance survey will quickly determine if an use exists and the condition of the habitat that use depends on.

OBJECTIVES:

1. Beneficial use status-focusing on salmonid spawning and cold water biota as the two most restrictive/sensitive uses

    a. presence/absence
    c. status

2. Arrive at some assessment of watershed integrity based on above

    a. limiting factors
    b. thresholds

3. Physical habitat condition-focus on requirements and needs related to salmonid spawning and cold water biota

4. Try and establish relationships between predominate NPS activity and potential WQ impairments to beneficial uses

    a. look at a sampling of reference and impacted sites
        1. forestry
        2. agriculture
        3. grazing

5. Provide data necessary to generate biological criteria requirements for WQ standards

METHODS

Robinson and Minshall (1992) used Discriminant Analysis and Principal Components Analysis in determining which measurements were most useful in distinguishing between ecoregions and stream types in their study of small streams in southern Idaho. Chemical measures of nitrate and conductivity proved important in separating ecoregions and impacted versus non-impacted streams. They also found quantitative physical measures of embeddedness, substrate size, width to depth ratio, and percent canopy cover useful in discriminating between ecoregions and stream type.

Plotnikoff (1992) found mean annual flow per unit area to be a useful measure for determining impacted streams from reference streams in Washington. He used qualitative measures of bottom substrate cover, embeddedness, pool riffle ratio, bank stability and streamside cover in describing physical habitat conditions. While Plotnikoff relied on qualitative measures of physical habitat he suggested quantitative habitat measurements might strengthen his correlations.

Mulvey et al. (1992) found quantitative measures of percent fines, large organic debris, residual pool depth, canopy closure and high water mark to be useful in distinguishing streams and ecoregions in Oregon.

Nelson et al. (1992) evaluated physical habitat attributes to determine which ones had the most discriminatory power amongst streams in Northeastern Nevada. Of the sweet of habitat variables evaluated, substrate embeddedness, gravel abundance, stream width and stream flow were the variables with the most discriminatory power among streams in different geologic districts.

Balls (1992) developed a method for assessing water quality in Montana streams based on periphyton community composition. He was able to distinguish mountain from plains streams and derive an assessment of biological integrity and overall imparement based on the periphyton make-up.

Based on the above findings and the desire to make the survey as simple as possible, conducted in a minimum of time and equipment the following was decided upon:

METHODS

Attribute	Parameter	Method/Protocol	Modification/ Criteria
Water Column	Shade	1. Densiometer IDEQ #8 Bauer and Burton p. 66	n=3 @ 3 successive riffles
	Nitrate (NO_3)	Hach model DR 100 (colorimeter)	
	Conductivity	YSI model 33	
Stream Channel/ Bank	Pool/Riffle	1. Thalweg profile IDEQ #4	tape and rod method
	Pool Quality	1. IDEQ #4 Bauer and Burton p. 120	
	Width/Depth	1. Bauer and Burton p. 86	for both wetted and bank full conditions
	Cobble Embeddedness	1. IDEQ #2	n=3 @ 3 successive riffles
	Percent Fines	1. IDEQ #2	see above
	Interstial Space	1. IDEQ #2	see cobble embeddedness
	Bank Stability	1. IDEQ #4 Bauer and Burton p. 96	
	Large Woody Debris	1. Platts et al. 1987	LWD >10 cm diameter > 1 m in length within bankfull zone of influence
Biological	Macroinvertebrets	1. IDEQ #5	n=3 from 3 different riffles, Hess, 300 count
	Algae	1. Robinson and Minshall 1987	see above
	Fish	1. IDEQ # 6	electroshocking, snorkeling view box

Reach surveyed for the above will be determined by the following:

if wetted stream width is <3 m at time of visit do a minimum of 100 m

if wetted stream width is >3 m at time of visit do 20 times bank full width

QUALITY ASSURANCE/QUALITY CONTROL

Quality assurance and control will be attained through the use of standardized protocols and methods (see Methods). Each crew member will undergo training in collection and measurements of above mentioned methods by appropriate field supervisor prior to begining field work. Field crews will be observed by independent professionals to ensure appropriateness of collection/measurement methods during field season. Duplicate (10 percent) macroinvertebrate and algae samples will be collected by audit teams. Conductivity meter will be calibrated daily. QA/QC for insect and algae identification will be according to Idaho State Laboratory procedures. Fish electroshocked will be identified by professional taxonomist with Idaho Department of Fish and Game. Fish species and age class observed via viewing boxes will be confirmed during field audit.

BURP STEP BY STEP FIELD PROCEDURES

Once crew arrives at site perform the following tasks:

1. determine length of reach to survey according to following criteria:
    a. if wetted width of stream is <3 m do a minimum of 100 m

    b. if wetted width of stream is >3 m do 20 times bank full width

2. mark and flag start and end points

3. get GPS coordinates if GPS available

4. take slope measurement, in percent, with clinonmeter

5. take flow, NO_3, and conductivity at bottom end of reach

6. proceed to first riffle upstream of starting (bottom) flag, note distance in m

7. the middle of the riffle will act as your first transect, once there collect/measure the following:

    a. wetted width and depth in m
    b. bank full width and depth in m
    c. do a cobble embeddedness measurement, radomized placement
    d. collect an insect sample above EMB measurement with Hess sampler, located via a random number, label whirl-pac and macro label to place inside, nuke with alcohol and whirl up
    e. collect algae sample from an undisturbed rock in this riffle, label whirl-pac and fill out label for inside, nuke with Lugol's solution (color of weak tea)
    f. take shade measurements with densiometer, right bank, left bank, upstream, downstream

8. proceed to next upstream riffle (2nd one) and repeat a through f above

9. proceed to next upstream riffle (3rd and final) and repeat a through f above

10. conduct quick riffle pool ratio by either stretching tape back down reach or up reach, or using 2 m pole, and note percent of riffles and pools encountered through entire reach

11. as doing 9 above do bank stability in percent for both banks through reach

12. before leaving fill out descriptive overview sheet (now that you've seen entire reach several times

13. pack up and head to next site...take a careful look around and make sure you haven't forgotten anything.